COLLEGE of CHARLESTON

THE GRADUATE SCHOOL

MES GREEN COMMITTEE (CASE STUDIES FALL 2008)

RECOMMENDATIONS TO THE CHARLESTON GREEN COMMITTEE FOR A SUSTAINABLE CHARLESTON, SC

MES Case Studies Class Fall 2008

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PURPOSE STATEMENT

To provide recommendations to the Charleston Green Committee for consideration during the creation and implementation of the Plan for Climate Protection and Sustainability for Charleston in order to make Charleston more sustainable for future generations

EXECUTIVE SUMMARY

In the Fall of 2008, the College of Charleston's Master's of Environmental Studies (MES) Case Studies course was assigned the task of making recommendations to the City of Charleston's Green Committee. By collaborating on this effort, the students gained hands-on experience in the research and drafting of environmental policy, while the Green Committee receives an alternative set of recommendations for the City's Sustainability Plan. To lead this initiative, a faculty member/Green Committee Chair facilitated the class with the help of a local leader in sustainability. The process was broken down into structure, process, and results.

Structure:
The Case Studies Class consisted of thirteen MES students and the two aforementioned advisors. Class meetings were two hours long and scheduled for twice a week for 15 weeks. After several introductory classes on the City of Charleston's current initiatives as well as other US city initiatives, the process of drafting began. The students were in charge of creating a work plan, schedule, goals, and final product.

Process:
Beginning with a brainstorming session of "Good Ideas", the students considered every aspect of sustainability as it applied to Charleston. Students evaluated multiple city plans for inspiration as well as took into account recommendations already laid out by the Charleston Green Committee. The ideas were then narrowed down based on feasibility, cost, and potential for implementation. Students selected recommendations from the list and were charged with researching the topic, making local contacts, partnering with the Green Committee when necessary, and drafting the final language. The same language and formatting was used, streamlining the recommendations with the Green Committee's format. Throughout the process the class presented their work to their peers for revision and assistance. The class finalized their recommendations into 1-2 page summaries with attached appendices for definitions, examples, and additional information.

Results:
The final product consists of 24 recommendations (see Table 1) discussed in detail in this paper and in a public presentation given on December 8, 2008 (see attached CD). The Case Studies class presented these recommendations to the Charleston Green Committee on Tuesday, December 9, 2008.

Category	Number
Buildings	7
Education	2
Energy	3
Land Use and Planning	5
Transportation	3
Waste and Recycling	4

Table 1. Number of recommendations in each Category

Recommendations include:

- Every City building energy bill online
- Energy audits for every building sold
- Participating in sustainability training for building professionals
- Shore power at the Port of Charleston
- Encouraging native plant use in landscaping
- Telecommuting
- Increasing recycling throughout the city

The Fall 2008 MES Case Studies students fully support the Green Committee and request that their recommendations will be taken into consideration during the creation and implementation of the Sustainability Plan. For questions regarding individual recommendations please refer to the appendices (**Appendix A; A-1**) for a list of recommendation and contact information.

BUILDINGS (See Appendix B)

B-1

Recommendation: Charleston Green Business Program

Summary of Specific Issues

Currently no policies or programs exist to minimize energy use and encourage waste stream reductions for Charleston area businesses. Unnecessary energy use and waste is leading to greater energy bills and a strain on waste stream management. Local governments around the nation are developing local green business programs to become more sustainable. National programs such as Green Restaurants and Green Hotels programs are in existence, but few if any businesses in Charleston participate in them. City governments like San Francisco and Sonoma in California have developed their own green business programs unique to their needs and capabilities that can serve. These and other examples can serve as models for the development of a Charleston green business program that will help to show Charleston as a leader in the sustainability movement on the east coast.

Strategy/Action Plan

- Develop a partnership of government agencies and utilities that assists, recognizes, and promotes local organizations, focusing on small- to medium-sized consumer-oriented businesses that volunteer to operate in a more environmentally responsible way.
- Develop a certification process that includes standards for conserving resources, preventing pollution, and minimizing waste, which participants must meet. The certification process will take principles from various programs such as the San Francisco and Sonoma Green Business programs, Leadership in Energy and Environmental Design (LEED), and the Green Building Initiative. Examples of possible standards include energy efficiency best management practices, sustainable purchasing, solid waste management, and worker and patron education.
- Create categories within certification process for various types of businesses to meet associated standards like hotels, restaurants, offices, and retail.
- Develop application and auditing process for participating businesses.
- Develop website for citizens to shop participating green businesses.
- Design incentive program to recognition ceremony, website, promotional events, and media coverage.
- Educational Tools will be developed that include webinars and training programs as well as self-assessment surveys to identify areas of improvement.

Implementation Responsibilities/Assignments

Charleston Metro Chamber of Commerce
Green Business Coordinator
Various City Government Organizations for Auditing
Possible Graduate Student Internships for Development and Oversight

Cost to Implement/Net Savings from Implementation
Program Management Staff
Graduate Research Funding
Savings include lower cost of energy bills and improvements in operating efficiencies

Additional Benefits
- Public recognition for commitment to environmentally friendly building management practices
- Marketing advantages
- Window decals, certificates, and promotional materials

Attachments
SEE **Appendix B-1**

References

Green Building Initiative	www.thegbi.org/home.asp
U.S. Green Building Council LEED Rating Systems	www.usgbc.org/leed
Green Restaurant Association	www.dinegreen.com
San Francisco Green Business Program	www.sfgreenbiz.org
Bay Area Green Business Program	www.greenbiz.ca.gov/
Sonoma Valley Green Business Program	http://sonomachamber.org/page84.html

B-2

Recommendation: Green Building Coordinator

Summary of Specific Issues

As both mandates and public demand increase, both citizens and city staff will look to the city for support. The City of Charleston *needs to have at least one point person* overseeing their green building program.

Strategy/Action Plan

The Green Building Coordinator (Job Description in **Appendix B-2**) develops policies and programs related to energy resource management for the City and community. Coordinator will plan, direct, coordinate, and supervise implementation for various energy efficiency initiatives and renewable energy projects. Tasks include, but not limited to: supervising municipal and community development and coordinating inter-divisional and inter-departmental implementation of the City's Green Committee recommendations, development of education and outreach program, fundraising, service contact management, and consulting. Requirements: Thorough knowledge of Green Building programs, state and local legislation, LEED AP, EarthCraft House certificate, Energy Auditing experience preferred as well as an understanding of new buildings, existing buildings, deconstruction, and renovation.

Estimated Greenhouse Gas Reductions to be Achieved

25-30% reduction in energy usage (USGBC) on average.
Non-quantifiable include: reduction in C&D waste, reduced water usage, reduction in landscaping costs, increased worker productivity, decreased life-cycle costs, support for local economy, and reduced operating costs.

Implementation Responsibilities/Assignments

The mayor should *immediately* appoint/hire a qualified Green Buildings Coordinator. The position requires cooperation with all City agencies and input from state and regional agencies.

Cost to Implement/Net Savings from Implementation

Cost includes yearly salary and office start-up costs—$40,000-$70,000 salary and ~$10,000 start-up office including energy auditing equipment. By hiring a staff Green Building expert, there is no need to hire a LEED Accredited professional, Energy Auditor, or consultant for every project.

Additional Benefits

Increase efficiency and consistency among city buildings
A designated intermediary between builders, contractors, etc.
Increase visibility of Charleston for Green Business practices
Reduce workload on existing staff members.

B-3

Recommendation: Energy Audits on buildings before sale

Summary of Specific Issues

Currently under ***Title 27 Chapter 50 Article I, Section 27-50-30*** the South Carolina Department of Labor, Licensing, and Regulation requires a disclosure statement mandatory for the selling of a property. Disclosures range from foundation problems to adjacent noise disturbance (see **Appendix B-3**). The State of South Carolina does not exceed the minimum national standards for the selling of property.

Strategy/Action Plan

Appeal to the state or create a local ordinance that requires disclosure of historic energy use in residential and commercial buildings to facilitate and require energy efficiency improvements at point of sale. Benchmarking should be accomplished through HERS ratings, EPA Energy Star and DOE/EPA
CBECS databases.

Implementation Responsibilities/Assignments

Work with responsible agency in drafting language for requirements. Provide training and assistance to the Association of Realtors as well
as homebuyers on the importance of this program as well as the technical detail. Get inventory of existing energy auditors and training programs.

Cost to Implement/Net Savings from Implementation

Administrative costs.
Potential to dramatically improve existing housing stock and the creation of new jobs.

Additional Benefits

Lower environmental impact in construction, operation and maintenance of buildings.
Better indoor air quality.
Lower construction waste.
Higher water efficiency.
Better use of new and existing materials and resources.

Timeline for Implementation

At least a year to draft the language and get state support. Timeline could be greatly reduced if local ordinances are used to strengthen state laws.

Citations and References

www.energystar.gov; HERS Rating System (**Appendix B-3**)

B-4

Recommendation: Training in Green Building for Contractors and Sub-Contractors

Summary of Specific Issues

As the demand for green building continues to increase, those in the related fields are pressured to rise to meet expectations in order to stay competitive. In order to keep up with the steady changes in green building techniques and rating systems, professionals must participate in a variety of green building training programs. Although private training programs exist, the need far exceeds the quantity.

Strategy/Action Plan

To address the growing demand for green building training, develop a partnership with the Chamber of Commerce, trade and professional associations, foundations, non-profits, neighborhood organizations, home owners associations, Home Builders Association, Charleston Green Builders Council, Charleston AIA and others supporting and promoting sustainable building practices to create and implement a green building training program.

Programming would include workshops for all fields related to the green building industry. Example includes: Green Building Seminar Series: monthly lunch seminars are open to all building professionals and all City personnel. Learning Unit and Continuing Education credits should be made available for AIA/CES, IDCEC, BOMI, CoreNet Global and IFMA and other appropriate groups.

Implementation Responsibilities/Assignments

Select department, group, or individual in charge of coordinating and implementing classes. The Sustainability Coordinator or Green Building Coordinator would be responsible for implementing these programs. If neither is available, graduate level internships could be created to work with the City on this recommendation. See Green Building Coordinator recommendation for more information.

Cost to Implement/Net Savings from Implementation

Costs will be minimal if programming is conducted in house or through other agencies. Savings indirectly include all of the benefits seen in green building. In addition, this will greatly help the local economy by providing much needed training to the community in a time of need.

Additional Benefits
Lower environmental impact in construction, operation and maintenance of buildings.
Better indoor air quality.
Lower construction waste.
Higher water efficiency.
Better use of new and existing materials and resources.

Timeline for Implementation
Six months to create, organize, and implement the first series of trainings.

Citations and References
Kats, G. H. (2003). "The Costs and Benefits of Green Buildings", A Report to California's Sustainable Building Task Force, Capital E.

McGraw-Hill website:
http://www.construction.com/SmartMarket/greenbuilding/Default.asp
accessed March 2008.

Yates, A. (2001). Quantifying the business benefits of sustainable buildings, BRE.

Additional Information

http://boulderspace.wordpress.com/2008/02/06/city-of-boulder-green-building-and-green-points-code-training-series/

http://www.smartcommunities.ncat.org/buildings/gbprogrm.shtml

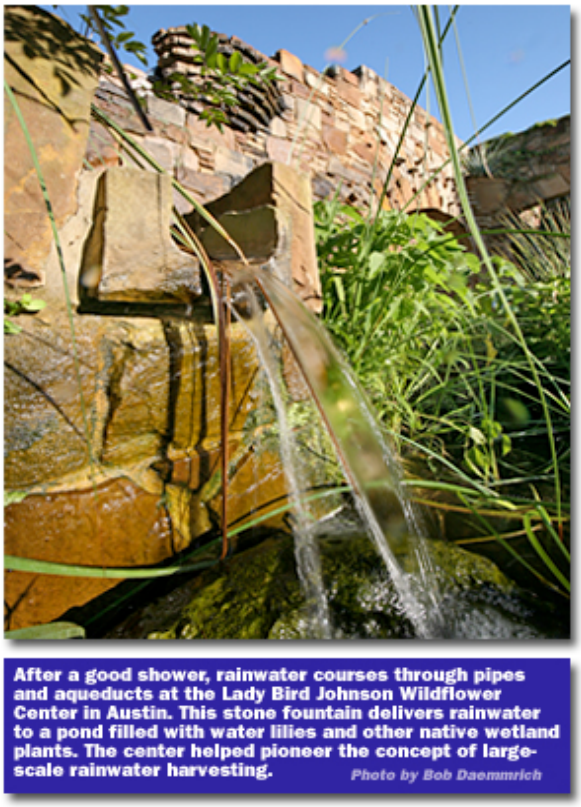
http://www.usgbc.org/DisplayPage.aspx?CMSPageID=109

B-5

Recommendation: Implementation of rain catchment systems on city buildings to provide an alternative water source.

Summary of Specific Issues

Irrigation of city building landscapes accounts for a significant proportion of water use. This use of water places higher demands on public utilities and can lead to the depletion of a limited water resource. Utilization of rain catchment systems to provide water for irrigation and other indoor uses can reduce this unnecessary demand by more than 30%.



After a good shower, rainwater courses through pipes and aqueducts at the Lady Bird Johnson Wildflower Center in Austin. This stone fountain delivers rainwater to a pond filled with water lilies and other native wetland plants. The center helped pioneer the concept of large-scale rainwater harvesting. Photo by Bob Daemmrich

From Texas Commission on Environmental Quality

Strategy/Action Plan

Require all suitable city buildings to employ rain catchment systems where feasible. This feasibility depends on direction and steepness of the roof slope as well as the demand for water. Smaller buildings with fewer than 30 employees are suitable candidates for these systems. In future, all new city buildings and renovations should incorporate rainwater-harvesting systems into their design and construction. These additions use harvested rainwater for landscape irrigation and restroom facilities without necessitating water treatment, which can cause toilet plumbing deterioration.

Estimated Greenhouse Gas Reductions to be Achieved

This figure will vary depending on the amount of rainwater harvested leading to less dependence on potable water for restroom and irrigation use. For the months of June through August, when the average annual rainfall is the greatest (6.4-7.2"/month), rain catchment systems will result in a significant reduction in the demand for treated water. This use of untreated rainwater will decrease the amount of water to be processed at municipal water treatment facilities. Several "model" systems (Lady Bird Johnson Wildflower Center, Austin, TX. New Braunfels Municipal Utility District, New Braunfels, TX.) rely on harvested rainwater for the majority of their needs, while still having accessibility to city water in times of increased demand.

Implementation Responsibilities/Assignments

All city departments responsible for initiating, developing, permitting, approving and managing new construction and major renovation projects.

Cost to Implement/Net Savings from Implementation
The cost to implement is highly variable depending on the type of storage container utilized, as well as the level of water treatment needed. Therefore, using harvested rainwater strictly for restroom and irrigation is the most cost-effective option because it requires minimal treatment. It is much more cost effective to implement a rain catchment system into the initial building, rather than retrofitting an existing structure.

Examples:
Hays County Cooperate Extension Office (San Marcos, TX.) – The buildings catchment area is 2,500 sqft. The water is collected in a 750 gallon steel tank and a 1,600 gallon polyethylene tank. The water is gravity fed to a Master Gardener demonstration garden. The total cost to implement this system is **$1,125**.
J.M. Auld Lifetime Learning Center (Kerrville, TX.) – This system has a 5,000 sqft catchment area and the water is stored in two 3,300 gallon concrete tanks (6,600 gallon capacity). The rainwater irrigates several adjacent gardens. The total cost to implement this system is **$10,500**.

References
The Texas Manual on Rainwater Harvesting
Rainwater Harvesting Potential and Guidelines for Texas
Capital Regional District document: Rainwater Harvesting in Greater Victoria

Summary
Rainwater catchment systems would only be feasible for the city of Charleston if the buildings were designed from the beginning to utilize these technologies. Retrofitting is not a feasible option, and using the water for irrigation only would reduce the need to treat the water which is problematic.

B-6

Recommendation: Home Weatherization Program

Summary of Specific Issues

In order for the city to promote home energy improvement, funding must be provided for low-income individuals and families whom are not able to afford weatherization improvements. Oftentimes, these homes have the lowest rating in regards to weatherization yet they are unable to afford improvements. By developing a Home Weatherization Program with a broad client base, the city of Charleston can provide home energy improvements to those most in need.

Strategy/Action Plan

Research South Carolina Low-Income Energy Assistance Program as a model and expand the client base. Research number of homes that would fall under federal guidelines allowable for Home Weatherization. Develop funding mechanism through possibly through SCE&G or other organization. Develop partnership with local residential energy service providers to provide these home weatherizations. With several residential energy services providers in the state, this partnership could provide benefits to both parties.

Estimated Greenhouse Gas Reductions to be Achieved – Metric Tons/Year

Unknown since do not currently know what homes may qualify for the Home Weatherization Program.

Implementation Responsibilities/Assignments

Neighborhood and Community Services Department research number of homes within city that would fall under guidelines. City of Charleston develops program goals based on needs of low-income residents. SCE&G or organization assist in program development and provide source of funding. City Environmental Office takes lead in hiring professionals to weatherize the low income homes, for example local residential energy service providers. These residential energy services providers should be accredited and certified through RESNET.

Cost to Implement/Net Savings from Implementation

Cost to implement depends on if funding is available through South Carolina's Low Income Energy Assistance Program or through some other type of funding mechanism. A partnership with a local residential energy service provider could defray the cost and provide an increase in local jobs. For example, the Sustainability Institute of South Carolina provides home weatherizations at a cost of $150 per home. Depending on the amount of funding provided and the number of homes that qualify the program should not cost as much to implement with such a low cost of weatherization. However, the

program would require either extra staff hours or additional staff to filter through homes that may qualify for the Home Weatherization Program. As mentioned before the program would also require contracting and installation of the home weatherizations which could be done by the Sustainability Institute of South Carolina or another local residential energy service provider. Net savings are currently unknown since the number that may qualify for the program is unknown.

Additional Benefits
Energy and resource savings for community at large
Improve sustainability of existing built environment
Possibility of creating more jobs

Citations and References:
Kansas City Plan
South Carolina Low Income Energy Assistance Program
Sustainability Institute
http://www.natresnet.org/

B-7

Recommendation: To assesses the climate impact of City developmental projects as well as those projects City funded

Summary of Specific Issues

The city of Charleston is a major landowner and has numerous city buildings and others under development. In addition, the city also provides funding for a number of private projects. Currently the city of Charleston does not require any type of climate assessment during its approval stage of government buildings or for funding of private projects. By assessing the climate impact of both its own developments and the private developments in which funding is provided, the city would be able to promote sustainable development.

Strategy/Action Plan

The city will assess the climate impact of its own development projects in advance. Any private projects requesting funding from the city of Charleston will also be required to assess their climate impact before approval of funds. Furthermore, the assessment would lead to development of a mitigation plan in order to address problem areas. The city of Charleston must develop a standard method for assessing climate impacts. This assessment should incorporate sustainable development practices and energy saving appliances.

Estimated Greenhouse Gas Reductions to be Achieved – Metric Tons/Year

The estimated Greenhouse gas reductions to be achieved are unknown since the assessment is focused on future developments. However, it can be assumed that there would be significant reductions in Greenhouse gas emissions by requiring both the city and city funded projects to assess their climate impact and then design a mitigation plan for their emissions.

Implementation Responsibilities/Assignments

All city departments will conduct climate assessments on their future developments and on private developments requesting funds. All city departments will also be responsible for developing a mitigation plan for the project. The city of Charleston will design a standard method for assessing the climate impacts for all projects.

Cost to Implement/Net Savings from Implementation
Cost to implement would involve staff time devoted to developing a standard climate assessment. Furthermore, staff training provided in order to ensure use of assessment for all developments. Must also include in cost the time and effort taken by private individuals seeking funding to assess their climate impacts. Hiring of Sustainable professional could defray costs and provide opportunities for educational workshops about climate assessment for city employees and private developers. Net savings from implementation unknown since assessments are on future projects.

Additional Benefits
City is leading by example – encourage sustainable development outside of own projects
Can lead to preserving green space, minimizing traffic impacts, addressing air and water quality, and noise pollution

Citations and References
Kansas City – implementing this recommendation in 2009

EDUCATION

EDU-1

Recommendation: Environmental Education/Awareness Program

Summary of Specific Issues

In order for Charleston to maintain a sustainability initiative, the idea of environmental protection planning needs to be institutionalized in the school system as well as providing awareness programs for surrounding communities. This recommendation looks at instituting environmental education programs in the Charleston County schools, including further development and awareness programs with Santee Cooper, Lowcountry Environmental Education Programs (LEEP) and Lowcountry Earthforce. The Charleston County schools are going through a redesign process, so this is a good time to introduce an environmental aspect to the curriculum.

From newhorizons.org

Strategy/Action Plan

Environmental education programs that are already in existence will be used as starting blocks for a more comprehensive program. Santee Cooper, LEEP, and Lowcountry Earth Force already have established programs for teachers and administrators. This recommendation calls for the approval of adding an environmental education aspect to the curriculum for each grade level, as well as information and training sessions for teachers and administrators.

Santee Cooper has a well established link to schools in Charleston. They have many resources including PowerPoint presentations for energy efficiency, etc. Their education programs also include an Energy Educator's Institute that provides certified teachers with Master's credit through Charleston Southern University.

All environmental programs are voluntary and done on the basis of interest. It is the goal of this recommendation to formalize the requirement of an environmental education component of the CCSD curriculum.

Implementation Responsibilities/Assignments

To gain support from the community, parents, administrators, and teachers, the addition of an environmental education curriculum would have to be shown to improve test scores. LEEP, Santee Cooper, and the Lowcountry Earth Force are currently working together to come up with a comprehensive environmental education program designed for all Charleston County Schools. In 1998, the State Education and Environmental Roundtable (SEER) published a report on the effects of using the environment as a context in teaching children. Their research found that this type of method produced:

1. Higher scores on the standardized testing in reading, writing, math, science, and social studies.
2. Reduced discipline and classroom management problems.

3. Increased student engagement and enthusiasm for learning; and
4. Greater pride and ownership in student's accomplishments.

Citations and References

Santee Cooper -
https://www.santeecooper.com/portal/page/portal/SanteeCooper/CommunityEducation/EnergyEducatorsInstitute

Lowcountry Earth Force -
http://www.earthforce.org/section/offices/lowcountry/lclocal_programs

LEEP – http://scleep.org/

Charleston Green Committee –
http://www.charlestoncity.info/dept/content.aspx?nid=1455

EDU-2

Recommendation: Community Center

Summary of Specific Issues

A downtown community center would provide an outlet for the community to discuss green ideas and participate in environmental awareness programs. Building a place where people can come together and discuss important issues, as well as a place where people can learn about things they can do at home to decrease energy costs, decrease their carbon footprint, and learn about other ways they can personally help make Charleston "greener" is a critical and essential part of making this region more sustainable. An important aspect to making Charleston more sustainable is clearer communication between people and organizations. As we have found throughout this process, when communication is not clear ideas are lost or replicated. Along with the community center, there is the possibility for an online forum modeled after the Climate Dialogues designed in the Seattle Action Plan. This forum has been extremely successful in gaining public, political, and economical support from the community and the state.

This community center would be run and funded by the City of Charleston and act as an impartial meeting place, with the goal of creating a central place for environmental organizations and green businesses to focus on and improve communication. Great examples of these are seen in Seattle, WA.

Strategy/Action Plan

The community center would be a central, organized avenue for citizens' voices to be heard. "Big Boards" could be housed here as well as discussion groups focusing on ideas for the future of Charleston, native gardening classes, car pool bases, after school programs, environmental awareness programs and energy saving workshops provided by the Sustainability Institute. Big Boards are literally large boards that would pose questions at the top for the community to write answers on, such as "What would you like to see done to make Charleston greener?". This center is a place to bring many other recommendations together, such as a composting demonstration, native species garden, and holding Green Businesses meetings.

The community center may also provide before and after school programs. With budget cuts and curriculum demands for meeting testing requirements, environmental education programs may have a harder time being institutionalized in the school system. Providing these programs at a community center would be an effective way to administer similar programs as well as giving kids an outlet for afterschool activities.

Implementation Responsibilities/Assignments

Currently, 113 Calhoun shows the greatest potential to start this type community center. The location is downtown and central to bus lines and already is the location of many workshops.

Once the center is finalized, there will be a number of full-time positions, as well as full-time facilitators for online forums and staff members to keep up the website. The center will also be staffed by volunteers from high school organizations, undergraduate organizations, and community members. Once discussion forums begin, onsite and online, liaisons between the community center and public officials will be put in place so that the ideas talked about will reach fruition.

Citations and References

Seattle Climate Action Plan -
http://www.seattlecan.org/resources/civic_participation/climate_dialogues.html

Seattle Climate Dialogues – http://www.climatedialogues.org/

ENERGY

E-1

Recommendation: Make City Electric Bills Easily Available For Public Viewing

Summary of Specific Issues

Money used to pay city electricity bills comes directly from taxes levied by the city government. There is a greater incentive for the city to invest in energy efficiency if the public is aware of how their tax money is being spent on buildings and infrastructure.

Strategy / Action Plan

The city could approach this issue in two ways:

- Create a page on the City of Charleston website that tracks the city's energy usage month to month and year to year in order to demonstrate the city's electrical usage history. This information is available through SCE&G.
- The city could also begin to do mass mailings detailing the City's electrical usage, although this is less environmentally preferable and more costly.

Estimated Greenhouse Gas Reductions to be Achieved – Metric Tons/Year

There is no quantifiable connection between creating awareness and greenhouse gas reductions, but an undefined correlation could be established over time.

Implementation Responsibilities / Assignments

This would be implemented directly by the City through the Department of Budget, Finance, & Revenue and / or through the Green Committee staff person.

Cost to Implement / Benefits from Implementation

There is virtually no cost associated with a webpage; a mass mailing would be a pricier option. [There are approximately 55,000 households in Charleston - 121,569 total population (2008 estimate) / 2.23 persons per household (2000 estimate)
55,000 x $0.42 (cost of a stamp) = $23,000 per mailing]

Timeline for Implementation

Immediate implementation is possible. A mailing may take more time due to budgets.

Challenges / Complications

This kind of transparency will be undesirable from the standpoint of the city government unless they are willing to tackle the problem of energy efficiency in the first place. Otherwise the website and / or mass mailings will only show shortcomings rather than successes.

A website is not always the most effective way to communicate if people do not know it exists. The website must be advertised in an effective way; otherwise it may not be visited, defeating the purpose of its creation.

Citations and References

http://www.charlestoncity.info/dept/content.aspx?nid=198

E-2

Recommendation: Feasibility Study for adding Shore Power at the Port of Charleston's Terminals

Summary of Specific Issues

Ocean Going Vessels account for 93% - 18% of the Port's total emissions depending on the pollutant in question. Ocean going vessels produce 1,492.0 tons of Nitrous Oxides (NO_x), 145.3 tons of Carbon Monoxide (CO) and 1,076.0 tons of Sulfur Dioxide. As much as one half of pollutants were generated while docked running auxiliary power to generate both electrical power for the ship in port as well as to keep the fuel for the main engines warm enough to maintain appropriate viscosity (South Carolina Ports Report 2005).

Strategy/Action Plan

Both the Port of Charleston and SCE&G should work together to establish the costs, infrastructure requirements, and man power they would need if the Ports were to switch to offering shore power as well as the projected income from such a project.

Estimated Greenhouse Gas Reduction to be Achieved – Metric Tons/Year

Shore Power would cut these emissions by approximately thirty percent if the best available technology is used at all the terminals associated with the Port of Charleston. This estimate is based on the findings of the Seattle Ports Authority and by the Port of Charleston emission report. If shore power were to be fully adopted by the Port the reduction in GHGs would be approximately 177.5 tons per year NO_x, 13.62 tons per year CO, and 178.9 tons per year Sulfur Dioxides.

Implementation Responsibilities/Assignments

The responsibility will need to be split between SCE&G and the Port. SCE&G will see if it is possible to run power to the port and the Port will need to investigate whether or not it is possible to retrofit the terminal to provide power to the ships. The cost is unknown. The study should be completed between 2011-2013.

Additional Benefits

Attract green companies.
Attract lines that have already begun to switch to shore power capable ships.
Better Air Quality in the area around the port.
City and SCE&G could generate income by selling the electrical power.

References

South Carolina Ports, 2005 Port of Charleston Air Emissions Inventory. September 2008

Seattle, a Climate of Change: Meeting the Kyoto Challenge, Seattle Climate Action Plan. City of Seattle, September 2006

E-3

Recommendation: **Change municipal procurement requirements to incorporate life cycle cost considerations**

Summary of Specific Issues

Office appliances consume nearly 7 percent of total commercial electric energy per year, translating to a cost of 1.8 billion dollars (ACEEE, 2008). Currently, City contracts are awarded using a 'lowest bid' criteria, in which purchases are made based upon lowest cost with no regard to the energy cost of running the equipment. Without considering operating costs, the purchase of cheaper, energy inefficient equipment may result with greater expenditures over the life-time of the equipment. Energy use is generally the single largest expense over the course of an office product's lifetime (EPA, 2008).

Strategy/Action Plan

A City Council directive to require life cycle assessments be taken into consideration in procurement procedures. This creates a system in which the purchase of energy inefficient products would be less likely, and save the City money.

Estimated Greenhouse Gas Reductions to be Achieved – Metric Tons/Year

While the numbers for Charleston County are unavailable, between 1993-2000, it is estimated that the total number of EnergyStar appliances sold in the United States reduced nearly 11 Million Tons of CO_2 emissions from being released into the atmosphere (Webber, 2000).

Implementation Responsibilities/Assignments

Implementation responsibilities are straightforward; a council directive requiring the life cycle assessment be taken into consideration.

Cost to Implement/Net Savings from Implementation

Implementation costs would be minimal in terms of changing the actual procurement standards. On average, EnergyStar appliances are between 30-70% more energy efficient than their conventional counterparts (Webber, 2000), depending upon the type of appliance in question. For a 'typical' office environment of 100 people, this could equate to nearly $5,000 saved (EPA, 2001). These savings could be used to offset the higher upfront cost usually associated with energy efficient appliances.

Additional Benefits

Purchasing of energy efficient appliances (i.e. EnergyStar) could also be incorporated in other green certification programs (i.e. LEED), which are highly visible to the public and could be used by the City to generate positive publicity.

Timeline for Implementation

Change could be initiated as soon as City Council passed such a requirement.

Citations and References

American Council for an Energy Efficient Economy. Online Guide to Energy Efficient Commercial Equipment http://www.aceee.org/ogeece/ch5_office.htm. Accessed 12/08.

U.S. Environmental Protection Agency. 2001. Energy Star Buyers Guide to Purchasing Energy Star Labeled Office Equipment. 4p.

U.S. Environmental Protection Agency/ Department of Energy. Energy Star Website http://www.energystar.gov/index.cfm?c=home.index. Accessed 11/08.

Webber, C.A., Brown, R.E., Koomey, J.G. 2000. Savings estimates for the Energy Star voluntary labeling program. Energy Policy 28: 1137-1149.

Attachments

Buyers Guide, **Appendix E-3.**

LAND USE AND PLANNING

LU&P-1

Recommendation: Low Impact Development Strategies for Stormwater Management

Summary of Specific Issues

Low Impact Development (LID) is an innovative stormwater management approach with a basic principle that is modeled after nature: manage rainfall at the source using uniformly distributed decentralized micro-scale controls. LID's goal is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source. Techniques are based on the premise that stormwater management should not be seen as stormwater disposal. Instead of conveying and mana ging / treating stormwater in large, costly end-of-pipe facilities located at the bottom of drainage areas, LID addresses stormwater through small, cost-effective landscape features located at the lot level. (Excerpt taken from www.lid.org)

Strategy/Action Plan

Adopt a decentralized stormwater strategy for all new development in Charleston County. Include specific BMPs not mentioned in the revised Stormwater Design Manual Draft Document (June 2008) such as permeable pavers, rain barrels and cisterns, tree box filters, rain gutter disconnects, and vegetative roof covers (see Appendix). Discourage end-of-pipe facilities, curb and guttering, and conveying stormwater systems by offering an expedited stormwater application approval for those new developments utilizing LID.

From fcwc.org

Implementation Responsibilities/Assignments

City of Charleston's City Council would be responsible for reviewing and adapting LID practices in the draft stormwater design document. Also requires revision of current application process to allow for expedited application approval for LID stormwater management.

Cost to Implement/Net Savings from Implementation

Three separate cost analyses by Schueler (1987), Heaney et al. (2002) and Thurston et al. (2003) found that in centralized systems modeled costs increased as storage and treatment volume increased. However, in decentralized storm water measures there was a realized savings up to 40% of the flow volume. LID technologies the burden of costs is shifted from the public to the private sector. However, commercial and residential homebuilders may realize tax benefits from Leadership in Energy and Environmental Design (LEED)

certifications. Many of the practices listed in the appendix offer points in the LEED system, like sustainable silting, innovation and design, water efficiency, protecting and restoring natural sites. Developers may also reduce construction costs by reducing the need for paving, curb and guttering, piping, inlet structures and storm water ponds. Societal benefits of LID practices include on-site treatment of non-point pollution sources, such as nitrogen, phosphorus, oil grease, heavy metal and trash, maintaining base flows for streams and biological integrity, groundwater recharge and an overall increase in water quality (Braden and Johnson 2004).

Additional Benefits

Reduced the burden on existing stormwater pipe conveyance systems and achieve MS 4 Phase 2 requirements of reducing the quantity pollutants discharging into our waterways. Benefits also include improved water quality and protecting existing hydrological functions of our waterways. Studies show that hydrologic functions of streams change with as little as 5 -10 % impervious surfaces and exhibit a drastic change when impervious increases over 25% (Shueller 1994, 2003).

Timeline for Implementation

June 2009

Citations and References

Braden and Johnson (2004) "Downstream Economic Benefits from Storm-Water Management" Journal of Water Resources November /December, 498-505

Heaney et al. (2002) "Costs of storm water control." EPA 600-R-02021, U.S. Environmental Protection Agency, National Risk Management Research Laboratory, Washington D.C.

Kalman et. al. (2000) "Benefits-Cost Analysis of Stormwater Quality Improvements." Environmental Management. 26 (6) 615-628.

"Low Impact Development for Big Box Retailers." (2005) EPA Study AW-832-03101 Office of Water. Prepared by Low Impact Development Center, Inc., Beltsville, Maryland.

The practice of Low Impact Development. (2003) U.S. Department of Housing and Urban Development H-21314CA prepared by NAHB Research Center. Upper Marlboro, Maryland.

Schueler, T.R. (1987). Controlling Urban Runoff: A practical manual for planning and designing urban BMPs, Washington Metropolitan Water Resources Planning Board, Washington, D.C.

Schueler, T.R. (1994). "The importance of imperviousness." Watershed Protection Techniques, 1(3), 100-111.

Schueler, T.R. (1995). Site planning for urban stream protection. Metropolitan Washington Council of Governments, Washington, D.C.

Thurston et al. (2003) 'Controlling Stormwater runoff with tradeable allowance for impervious surfaces." Journal of Water Resource Planning Management. 129(5), 409-418.

U.S. Environmental Protection Agency. 2000. Low Impact Development: A Literature Review. EPA-841-B-00-005.

U.S. Environmental Protection Agency. 2000. Field Evaluation of Permeable Pavements for Stormwater Management. EPA-841-B-00-005B.

LU&P-2

Recommendation: Community Garden

Summary of Specific Issues

Much of the food produced in our country travels hundreds of miles before reaching its final destination. This fact in conjunction with unstable oil prices has lead to the current increase in food prices around the country. Developing a source of urban agriculture within the City of Charleston will reduce the city's reliance on fossil fuels for its food and save money for residents.

From edibleportland.com

Strategy/Action Plan

Secure vacant property within the Charleston Peninsula and develop a community garden. Incorporate low impact development practices such as impervious pavers/surfaces and rain gardens utilizing native species into the property to reduce and treat stormwater runoff on site. Create and designate vegetable beds that can be leased to the public on a seasonal basis.

Estimated Greenhouse Gas Reductions to be Achieved – Metric Tons/Year

The potential reduction in greenhouse gas directly linked to the City of Charleston and its residents is unknown; however, indirect greenhouse gas reductions should be significant since produce from the average American grocery store travels approximately 1500 miles to reach its final destination.

Implementation Responsibilities/Assignments

The City of Charleston will be responsible for securing the property and funding its development. The Clemson Cooperative Extension Office and Ashley Cooper Storm Water Education Consortium can provide technical assistance in the planning and design of the garden. A partnership with local organizations such as Food Not Bombs or the South Carolina Master Gardener Program can be developed to assist in the garden's development and education of residents interested in leasing garden plots.

Cost to Implement/Net Savings from Implementation

The costs of implementing this action are unknown. The city will need to secure a vacant lot at the very least.

Additional Benefits

The development of a community garden will provide residents with a local source of healthy produce devoid of pesticides, preservatives and other unnatural substances as well as strengthen ties among residents and the city. Incorporating low impact development practices into the site can also serve to educate the public to the issues of stormwater runoff within the city.

LU&P-3

Recommendation: Pedestrian Zone

Summary of Specific Issues
The City Market is one of the most popular attractions within Charleston and is scheduled for a renovation and expansion in the near future. Due to the presence of heavy pedestrian traffic within the area and its high commercial and recreational value, the Market would be a logical location within Charleston to designate as a trial pedestrian zone.

Strategy/Action Plan
Install barriers at the City Market's current exit/entrance points and allow vehicular access to emergency vehicles and limited access to vendors, local deliveries, and Charleston Equine Sanitation. The vehicle limitations could be enforced 24 hours a day, during daily designated hours, or during specific times of the year. Discuss the possibility of purchasing additional property from the South Carolina Port Authority for designated City Market parking.

Estimated Greenhouse Gas Reductions to be Achieved – Metric Tons/Year
The potential greenhouse gas reduction achieved by this action is unknown.

Implementation Responsibilities/Assignments
This action would be implemented by the newly formed City Market Preservation Trust, LLC.

Cost to Implement/Net Savings from Implementation
The costs to implement this action are unknown but could be funded through the $4 million currently approved by the city for the Trust's renovation of the Market.

Additional Benefits
Limiting vehicular traffic within the City Market will not only reduce greenhouse gas emissions but may also increase revenue for local businesses. Creating a more pedestrian friendly atmosphere within an already popular destination for tourists and nightlife could increase visitation and local business. Development of a pedestrian zone in such a popular area may also encourage locals to utilize alternate forms of transportation in other areas of Charleston. The success of a pedestrian zone within the City Market would also serve as a valuable case study for the feasibility of pedestrian zones in other areas of Charleston.

Timeline for Implementation
This action should be implemented at some point during the Market's renovation and expansion beginning in May 2010 and ending in 2012.

LU&P-4

Recommendation: Adopt a Complete Streets Policy for the City of Charleston

Summary of Specific Issues

The transportation infrastructure in the City of Charleston is largely geared solely for automobile usage, especially outside of the downtown area. This is a major sustainability issue, because it discourages alternative forms of transit such as bicycle and pedestrian traffic.

Complete streets are designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists and transit riders of all ages and abilities must be able to safely move along and across a complete street.

Image from Completestreets.org.

Strategy / Action Plan

Complete streets should incorporate a number of different criteria: please see the **Appendix LU&P-3**.

Estimated Greenhouse Gas Reductions to be Achieved – Metric Tons/Year

Currently unknown or not directly measurable.

Implementation Responsibilities / Assignments

This would be implemented directly by the City through the Department of Traffic and Transportation and the Department of Planning and Neighborhoods.

Cost to Implement / Benefits from Implementation

Cost to implement is unknown as there are many factors involved in implementation (i.e. retrofitting vs. only new streets)

Benefits include:
Reduced GHG through lower automobile use.
Increased economic growth through accessible connections between neighborhood infrastructure.
Reduced transportation costs and travel time.
Higher property and home values.

Timeline for Implementation
Immediate implementation is possible for new streets being built in the City of Charleston and retrofitting is a possible long-term solution.

Problems / Complication
Seeing beyond the initial cost of implementation, to the long-term benefits is the biggest obstacle in implementing this measure.

Citations and References
http://www.completestreets.org

LU&P-5

Recommendation: Native and Naturalized Landscaping

Summary of Specific Issues

Using plants native to Coastal South Carolina for landscaping can reduce maintenance costs, stormwater runoff, temperatures by shading buildings, and energy costs, improve water quality, and increase wildlife habitat. Although ornamental landscaping does provide some of the above mentioned benefits, using native and naturalized plants for landscaping significantly reduces lawn maintenance costs by eliminating costs for labor, water, fertilizer, herbicides, insecticides, fungicides, replanting of annual flowers, and mowing (NIPC 1997, 2004).

Strategy/Action Plan

Adopt a native and naturalized landscaping ordinance that requires a landscape plan, which requires 50% of all landscaped areas to have plants natural to coastal South Carolina, for all new residential and commercial developments in Charleston County. Retrofit existing landscaping with natural landscaping on municipal properties.

From architectmagazine.com

Estimated Greenhouse Gas Reductions to be Achieved

Although quantifying a reduction in greenhouse gases is difficult, it is well known that all plants remove carbon dioxide from the atmosphere and store carbon in the body of the plant, root system, and soil contributing to a reduction of carbon dioxide (NIPC 1997, 2004).

Implementation Responsibilities/Assignments

The City of Charleston will be responsible for implementing a native and naturalized landscaping ordinance (examples at http://www.epa.gov/greenacres/). A staff member responsible for landscaping issues will be appointed to the Technical Review Committee and will be responsible for ensuring each new development has a plan associated with it. The City of Charleston will develop a multi-year retrofitting schedule for municipal properties.

Cost to Implement/Net Savings from Implementation

The lack of maintenance needed for natural landscaping will result in net savings. According to the Northeastern Illinois Planning Commission (NIPC), the combined costs of installation and maintenance for natural landscape over a ten-year period may be one fifth of the costs of conventional landscape maintenance (NIPC 1997).

Additional Benefits
Additional benefits include reduced soil erosion, improved water quality, reduced air pollution, reduced noise pollution, climatological benefits, reduced greenhouse gasses, habitat restoration and protection, and beautification (NIPC 1997, 2004).

Timeline for Implementation
Adopt a natural landscaping ordinance within one year for the City of Charleston and within 2 years for the County of Charleston. Retrofit municipal properties within 2 years.

Citations and References
Northeastern Illinois Planning Commission. 1997. Sourcebook on Natural Landscaping for Public Officials. Northeastern Illinois Planning Commission. Chicago, IL.

Northeastern Illinois Planning Commission. 2004. Sourcebook on Natural Landscaping for Local Officials. Northeastern Illinois Planning Commission. Chicago, IL.

Attachments
South Carolina Native Plant lists **Appendix LU&P-5 a** and **b**
Local Native Plant Sources list **Appendix LU&P-5c**

TRANSPORTATON

T-1

Recommendations: Telecommuting

Summary of Specific Issues

The average vehicle emits an average of about 12,100 pounds of CO_2 per year. Telecommuting can reduce automobile travel by up to 77% and reduce the need for office space and certain office needs. Telecommuting, which reduces both vehicle use and energy cost can reduce CO_2 emissions.

Photo by David Umberger

Strategy/Action Plan

Encourage telecommuting among City employees and businesses within the City that have employees that would be able to telecommute. The initial strategy could follow six basic steps.

- Identify the job types best suited for telecommuting.
- Identify the best candidates for a telecommuting program and train them. A sample employee application from the City of Los Angeles is attached.
- Research any state or federal incentives that off set the initial cost of equipment.
- Begin a trial period.
- Adapt the program and management techniques as needed.
- Track the program's results and set future goals.

Estimated Greenhouse Gas Reductions to be Achieved – Metric Tons/Year

Reduction will vary based on the amount of participating businesses and participation of individuals. According to a study by the TIAX for the Consumer Electronics Association, telecommuting saves 17-23 kilograms/day in CO2 emissions.

Implementation Responsibilities/Assignments

All city department heads that are responsible for initiating, permitting, approving and managing employee matters and office needs.

Cost to Implement/Net Savings from Implementation

Cost and savings will vary based on size of company, amount of participating employees, and the current computer networking hardware. Lessened office-space expenses can save a substantial amount of money. For example, Sun Microsystems have saved a reported total of $71 million in the reduction or avoidance of office-space expense. Cigna has reported a savings of $3000 per employee that telecommutes due to reduced office space. Savings can also apply to the telecommuter as well. For example, a College of

Charleston student telecommuted to class twice a week for six weeks and saved $1556.40 while only spending $22.78. Examples of potential networking costs are attached as well as the student case study showing the cost savings of telecommuting.

Additional Benefits
Improves worker productivity
Increases access to more qualified staff
Improves employee retention
Improves employee health
Reduce highway use
Reduce CO_2 emissions

Timeline for Implementation
Implementation is possible after an office is technologically prepared and employees have been properly trained.

Citations and References
Balaker, Ted. 2005. The Quiet Success: Telecommuting's Impact on Transportation and Beyond. Reason Foundation.
Bartholomew, Doug. 2004. Your Place or Mine? *CFO: Magazine for Senior Financial Executives*, Spring.
Helmbreck, Valerie. 2008. What will Telecommuting Cost Your Company? *Finance Tech News*, October 13.
TIAX. 2007. The Energy and Greenhouse Gas Emissions Impact of Telecommuting and e-Commerce. Consumer Electronics Association (CEA).
VPN Tools. 2008. What are the Upfront Costs of Networking? http://www.vpntools.com/vpntools_articles/vpn-products-and-costs.htm.

Attachments (Appendix T-1)
-Upfront Costs of Networking
-Student case study: Cost-Benefits of Telecommuting
-Sample application for telecommuting from The City of Los Angeles

T-2

Recommendations: Four-Day Workweek

Summary of Specific Issues

The average vehicle emits an average of about 12,100 pounds of CO_2 per year. In addition, buildings account for more than 40% of CO2 emissions worldwide. The electricity used in City of Charleston operated buildings contributes 63% towards the municipality's carbon footprint. A four-day workweek can reduce automobile travel as well as reduce the electricity needs for buildings. A four-day workweek, which reduces both vehicle use and energy cost can reduce CO_2 emissions.

Strategy/Action Plan

Encourage a four-day workweek among City employees and businesses within the City that have the potential to switch to a four-day workweek. An initial strategy would be to ensure that technology is available to be closed an additional day.

Estimated Greenhouse Gas Reductions to be Achieved – Metric Tons/Year

Reduction will vary based on the amount of participating businesses and participation of individuals. According to a study by the TIAX for the Consumer Electronics Association, not driving to work saves an average of 17-23 kilograms/day in CO2 emissions.

Implementation Responsibilities/Assignments

All city department heads responsible for initiating, permitting, approving and managing employee matters and office needs

Cost to Implement/Net Savings from Implementation

Cost and savings will vary based on size of company and the amount of participating employees, and the current computer networking hardware. Costs would include any technology upgrades for potential telecommuting (if applicable). Savings would include decreased driving and daycare costs for the employee and decreased energy, labor, and operational costs. Utah, which is performing a year long trial of the four-day workweek for 80% of the city employees, expects a savings of $3 million dollars. Avondale City Hall in Arizona showed an annual savings of $44,600 in electric costs and $9,400 in janitorial costs. Brevard Community College in Florida showed an annual savings of $267,000 in energy savings used to add 10 new full-time faculty positions.

Additional Benefits

Improves worker productivity
Improves employee retention
Improves employee health
Reduce employee absenteeism
Reduce highway use
Reduce CO_2 emissions

Timeline for Implementation

Implementation is possible immediately after potential technological needs have been met.

Citations and References

Copeland, Larry. 2008. Most State Workers in Utah Shifting to 4-Day Week. USA Today.

Madrid, David. 2008. Avondale's 4-Day Workweek Now Permanent at City Hall. The Arizona Republic.

TIAX. 2007. The Energy and Greenhouse Gas Emissions Impact of Telecommuting and e-Commerce. Consumer Electronics Association (CEA).

The Oil Drum. The Four Day Work Week: Sixteen Reasons Why This Might Be an Idea Whose Time Has Come. http://www.theoildrum.com/node/2996.

Zarrella, John. 2008. Four-Day Workweek Gets A+ at College. http://www.cnn.com/2008/LIVING/worklife/08/12/shorter.workweek/index.html.

T-3

Recommendation: Expansion and Improvement of CARTA services

Summary of Specific Issues

The Charleston Area Regional Transportation Authority suffers from a lack of funding and ridership in a city that has the potential to be highly transit oriented. This recommendation will enhance CARTA services to increase rider satisfaction through infrastructure improvements, fare formats and pricing.

From ridecarta.com

Strategy/Action Plan

Expand CARTA Shelter Program

- Increase number and quality of shelters at bus stops

Improve Signage

- Install schedule holders and post schedules and route information at specific stops

Improve Schedule Brochures

- Improve format of brochures to decrease confusion as well as utility
- Combine multiple route schedules into single brochure

Create affordable weekend passes appropriate for tourists

- Investigate potential for reduced fare weekend (2 day) passes
- Integrate reduced fares with hotel stays and visitor center patronage

Implementation Responsibilities/Assignments

Charleston Area Regional Transportation Authority
Charleston Area Convention & Visitors Bureau

Cost to Implement/Net Savings from Implementation

$400000 for 40 shelters (approx. $10,000 per shelter)
$10,000 for schedule holders at top 200 signs and shelters (approx. $500 per holder)
No extra cost for schedule brochures (under contract and easily changeable)

Additional Benefits

Improvement of rider satisfaction
Improvement of rider comfort

Citations and References

FY 2008 CARTA Annual Budget Report
Peter Tecklenburg (personal communication)

WASTE AND RECYCLING

W/R-1

Recommendation: Mulch and compost yard waste from city facilities and parks to be recycled for city use and reduce amount of yard debris sent to the landfill.

Summary of Specific Issues

Yard waste from residents and city parks is frequently brought to a landfill rather than mulched and reincorporated into the landscape. This debris is organic, and can be mulched and composted, instead of dumped at landfills. Often times this yard debris contains insects or pathogens that are detrimental to the landscape if it is reused without proper composting procedures. The problem for Charleston is being able to find an accessible area to downtown that is large enough to allow adequate room for composting.

Strategy/Action Plan

Work with a composting center to set up a contract to dump city yard debris. Utilizing a mulching/composting center would alleviate the problem of inadequate space for such practices within Charleston. Barr Construction Inc. in Mount Pleasant currently has contracts with municipalities to provide on-site mulching of yard waste. A contract should be drawn out that enables yard debris from city residents and parks to be dumped at the facility at a discounted rate. The discounted rate would be justified by the large amount of debris the facility would receive from the city, which in turn Barr Construction could sell back to individuals or municipalities.

From carolstream.org

Implementation Responsibilities/Assignments

Supervisor of Environmental Services-City of Charleston

Cost to Implement/Net Savings from Implementation

Because the city of Charleston currently collects yard debris, the cost to implement would only be the fuel cost differences between bringing this debris to the Bees Ferry Landfill in West Ashley, and Barr Construction in Mount Pleasant. Any differences between dumping fees between the two facilities would also be incorporated into this figure. Because no contract has currently been developed between the city and Barr Construction, this figure is not yet ascertainable.

Examples:
The town of Germantown, TN has had a similar system to the one described above in place for the past two and a half years. The Community Service Coordinator, Charmain Jones, has sited the only problem with the system has been the initial resistance to change. This town picks up yard debris left at the curb and brings it to a local private mulching company. The debris is mulched on site and sold as mulch to various private parties. Part of the contract between the city and mulching company included a provision that once a year in the spring several truckloads of mulch are brought to the city center where the town residents are allowed to take as much as they need for free. In the fall months, several truckloads of cut firewood are brought to the same area where residents are allowed on wheelbarrow full for free. In the past two and a half years, there has never been a surplus of mulch or firewood that the residents have not taken.

References

Charmain Jones - Community Service Coordinator, Germantown, TN (901) 757-7263
http://www.ci.germantown.tn.us/Sanitation_FAQS.html

Allied Waste Company, Bellevue, WA
http://www.rabanco.com/Collection/Bellevue/residential/residential_organic_debris.aspx

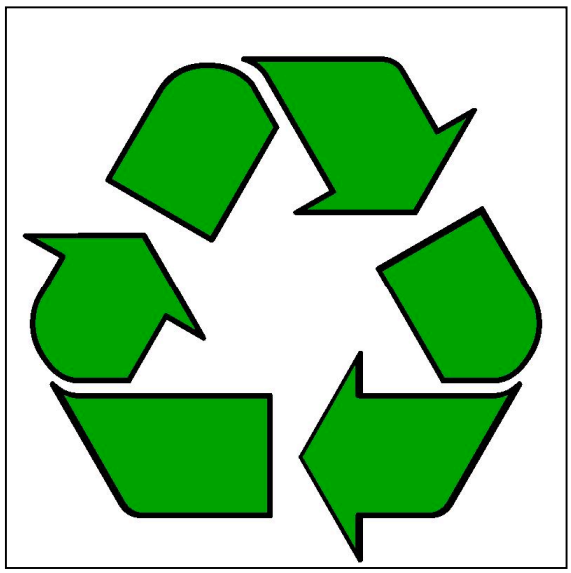
Christine Cooley -MUSC (843) 343-3589
Eric Schultz – (843) 724-3790

W/R-2

Recommendation: Increase recycling efforts by allowing more types of recyclables for pickup (more plastics, Styrofoam, etc.). (To work with cooperation of the County)

Summary of Issues

Part of the state of South Carolina's Climate, Energy, and Commerce Action Plan is to increase recycling efforts statewide. Recycling for the city of Charleston is handled by Charleston County and not the city. Any change must be county wide which includes: City of Charleston, City of Folly Beach, City of Isle of Palms, City of North Charleston, Town of Awendaw, Town of Hollywood, Town of James Island, Town of Kiawah Island, Town of Lincolnville, Town of McClellanville, Town of Meggett, Town of Mount Pleasant, Town of R ockville, Town of Seabrook Island, and Town of Sullivan's Island.



The prominent issue for the current items accepted for recycling is the market to purchase the recyclables, whatever they are. Currently there is a big and steady market for paper, aluminum, and steel. There has been a huge drop off in the last several months for plastics. Plastics are petroleum based, and many times it is easy for huge companies to buy new virgin plastics, through government incentives, etc. Glass has been on a decline lately. The county has a market for it but the profit they make is lost due to the buyer requiring the county to transport it.

The second issue is what curbside pickup trucks can collect. All recyclables collected must make a 90^{o} turn in the truck. Hence cardboard and large rigid plastics cannot be collected curbside. Retrofitting the county's current fleet of trucks will be very expensive and this is not one of the current county administration's top priorities.

Strategy

Watch the markets and when they are steady and demanding increase recycling. The county will be building a new MRF (Material Recovery Facility) in the future. The GINN Company (a developer) has purchased surrounding land and plans to build a luxury resort area downtown next to the current county MRF. The current location will be part of the 3rd and 8th holes of the proposed golf course. A consultant is currently working to determine a size and location for the county.

Estimated GHG Reductions: N/A

Implementation Responsibilities
Charleston County (**NOT** City of Charleston)

Cost to Implement
Exact figures are not available. Implementation of retrofitting the county collection fleet will occur if it is shown that a profit will occur for the city from the extra recyclables being picked up. This is unlikely with the current markets for plastics, and the markets for cardboard do not warrant curbside pickup at this time.

Additional Benefits
(1) More low education jobs. Can hire full time employees and offer full benefits with at least an eighth grade education.
(2) Reduces waste and space in landfills.

Timeline
Unknown. Consultant has already been hired and is working on finding the new location.

Citations
Jenny Bloom, Charleston County Recycling.
Christine Cooley, MUSC Recycling (see **Appendix W/R-2**)

W/R-3

Recommendation: Composting

Summary of Specific Issues

Organic material such as food, plant material, and yard trimmings are sent to landfills everyday where they produce methane, a gas 20-25 times more potent than CO_2, add to the already increasing volume of material within the landfill, and are lost to us as valuable material. By composting these materials the city of Charleston could provide landscaping and erosion control material for soils and substantially reduce the volume of material being diverted to landfills.

Strategy/Action Plan

- Education programs for businesses, schools, and residential communities on the benefits of composting.
- Help educate the public on uses of composted soil and organic diversion from landfill.
- Develop one-stop drop sites for recycling, composting, yard trimmings, and trash. Waste management will develop separate bin and pick up day for composting from residential and commercial areas (possibly a pilot program).
- Work with waste handlers, farmers, and other potential composters to develop a system of production and purchasing of composted soil.
- Advertise to landscapers, golf courses, private foresters, and organic farmers about purchasing the composted soil.
- Attempt to develop partnership with federal government to use compost material in forest soil regeneration or revitalizing brownfields within South Carolina. This program depends on partnering with local business and the government to produce a market for composted soil.

Estimated Greenhouse Gas Reductions to be Achieved – Metric Tons/Year

Unknown

Implementation Responsibilities/ Assignments

Department of Waste Management and Sustainability Coordinator develop program and facilitate closed loop system. Sustainability coordinator develops partnerships with local farmers, landscapers, private foresters, golf courses, and government official.

From gliving.tv

Cost to Implement/Net Savings from Implementation
Cost to implement would include salary for Sustainability coordinator, extra staff time to develop necessary partnerships, additional trucks for picking up compost, and composting site developed to produce composted soil. Net savings from composting could be substantial. From the City of Charleston's 2008 budget the incinerator brings in revenue of $10 million, however, it costs $23 million a year in operating costs. Composting would divert a significant amount of organic material from the landfill. This diversion would lower the operating cost of the incinerator while also providing a profit to the city from composted soil being sold.

Additional Benefits
Energy Resource Conservation
Extending landfill life
Produce Jobs
Promote local food production

Timeline for Implementation
Establish market and partnerships with government, 12 months. Offer composting to residential and commercial, 18 months.

Citations and References
Kansas City Plan
San Francisco residential "green cart" program
Missouri Organics
Neil Hudelson, Americorps VISTA, College of Charleston Community Service Center
Jenny Bloom, Charleston County Waste & Recycling

W/R-4

Recommendation: **Placement of recycle bins in high traffic areas downtown (e.g. the Market, Marion Square, King St., the Battery), as well as city parks.**

Summary of Specific Issues

There is a lack of recycle bins downtown, particularly in areas of high pedestrian traffic. Recycling offers a sustainable method in which to handle much of the waste that currently ends up being placed in the landfill or incinerated.

Golden Gate Park

From commons.wikimedia.org

Strategy/Action Plan

Placing recycle bins adjacent to existing trash receptacles in areas with high amounts of pedestrian traffic in downtown Charleston and city parks.

Estimated Greenhouse Gas Reductions to be Achieved

The environmental benefits of recycling are well known and widely accepted. As a nation, the United States recycled an estimated 32% of its waste; this avoided nearly 55 million tons of CO2 equivalents from being released into the atmosphere (NERC, 2008).

Implementation Responsibilities/Assignments

Currently, City of Charleston ground custodians, who are daily assigned designated areas, perform public street-side trash collection. Pickup in city parks is handled by the Parks Department. Placement of recycling bins near existing trashcans would alleviate the need for new pickup routes. Although Charleston County currently handles recycling duties, it may be cost effective for City of Charleston employees to handle collection due to the fact the infrastructure is already in place for them to do so.

Cost to Implement/Net Savings from Implementation

According to officials with the City of Charleston, the value of the type of receptacle that would be used in a public street-side recycling program, as well as in city parks, is estimated to be $350 (Hauck, 2008). The number of trash bins in the 'central business district' (e.g. areas around King, Broad and Market Streets) was estimated to be around 100. Thus, the cost of bins alone is up to $350,000. The figure for acquiring similar bins for city parks is approximately $650,000. Additional costs would be associated with operational resources (staff, trucks, etc.); however, exact cost is unknown. The money generated from recycling could be used to offset some of the total costs associated with

program startup. For instance, in the fiscal year 2008, the recycling of aluminum alone generated nearly $42,000 (Charleston County, 2008). Keep in mind these numbers could be expected to increase as waste is diverted from a landfill to a recycling center.

Additional Benefits

First off, no city can claim to be 'green' without addressing the issue of reducing municipal waste.

- Placement of bins in areas of high traffic gives tourists the idea that our city is actively seeking to reduce its consumption of materials and reduce its carbon footprint through diversions of waste (avoiding incineration or landfill placement).
- Equates to good marketing for the city (visibility)

Additionally, placement of recycling bins adjacent to existent trash receptacles offers a choice to individuals, something that is now nonexistent. The 'broken windows' theory suggests that the environment in which one is exposed inherently influences individual behavior, thus one argument that could be made is that a 'greener' community would lead to individual's making 'greener' lifestyle choices.

Timeline for Implementation

Placement of bins is relatively straightforward; securing of funds to purchase bins is a significant obstacle that may take time. Creation of an institutional framework between the City and County may also take some time. It must be noted that recycling within the larger city parks (Hampton, White point Gardens, Waterfront, Marion Square) is already expected to begin within next year.

Citations and References

City of Charleston Solid Waste Department website. http://www.charlestoncounty.org/departments/SolidWaste/index.htm. Accessed 11/08.

Hauck, K. 2008. Personal Communication.

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CONCLUSION

In the 2008 fall semester, the MES Case Studies course produced the above 24 recommendations for the Charleston Green Committee. The students selected topics that they felt are important for the creation of a more sustainable Charleston as well as problems that can be realistically addressed. While the recommendations cover many of the important issues facing the City of Charleston, time and resources limited students. Therefore, only a fraction of the initiatives available in and around Charleston and the tri-county area are listed. It was the goal of the class to assist the Green Committee in the development of their sustainability plan and their hope that the Committee considers their recommendations when finalizing their plans for the City Council. Charleston has the opportunity to be at the forefront of sustainability in the Low County and Southeast and the MES Case Studies class appreciates the opportunity to participate in the process.

ACCKNOWLDEGMENTS

We would like to thank the Charleston Green Committee, particularly Mitch, Ben, Carolee Williams, Dennis Knight, and Renee Patey. We would also like to acknowledge other members of the Charleston Community:

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Jenny Bloom, Charleston County Solid Waste & Recycling
Christine Cooley, Medical University of South Carolina
Henry Cerceo, Prudential Carolina
Peter Tecklenburg, CARTA
Ian Sanchez, LEEP,
Beth Donoghue, EarthForce
Neil Hudelson, Americorps Vista, College of Charleston Community Service Center

APPENDICIES

APPENDIX A

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APPENDIX A-1

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APPENDIX B

Buildings currently account for 39% of total energy use, 12% total water consumption, 68% of total electricity consumption, and 38% of carbon dioxide emissions (www.EPA.gov), so it is important that cities address where, how, and why they are being built. By adopting green building strategies, both public and private building owners can address the economic, environmental and social issues related to buildings.

The Office of the Federal Environmental Executive defines green building as "the practice of 1) increasing the efficiency with which buildings and their sites use energy, water, and materials, and 2) reducing building impacts on human health and the environment, through better siting, design, construction, operation, maintenance, and removal — the complete building life cycle."

Ninety-two cities have green building programs. This is the equivalent of 14 percent of all cities with a population greater than 50,000. McGraw-Hill Construction Analytics predicts that the value of green building construction starts to increase from $12 billion in 2008 to $60 billion by 2010, and by 2009, 80 percent of corporate America is expected to be engaged in green at least 16 percent of the time, while 20 percent will be engaged in green 60 percent of the time.

APPENDIX B-1

Bay Area Green Business Program Standards

Environmental Values at Work

The Green Business Standards presented below define what a business or public agency must achieve to be certified "green." Businesses in over 20 different industries have successfully met the standards and are now recognized as Bay Area Green Businesses.

There is great flexibility in how the standards can be achieved. The Green Business Program checklists provide additional information and suggested implementation measures. Measures previously implemented will be considered towards achievement of standards. Participants can request alternatives or exemptions for measures which are not feasible for their company.

Compliance Plus

To be a green business, first bring your operations into compliance with all environmental regulations. Then go beyond compliance to meet the general practices and targeted resources conservation and pollution prevention measure which are summarized below.

General Practices

1. Monitor and record rates of water and energy usage and solid and hazardous waste generation

2. Provide three on-going incentives or training opportunities to encourage management and employee participation

3. Inform your customers about your business' efforts to meet the Green Business standards

4. Assist at least one other business in learning about the Green Business Program and encourage them to apply

Resources Conservation and Pollution Prevention

Water Conservation

1. Conduct an indoor/outdoor water balance or assessment (if your business has not already had a water use assessment, the Green Business Coordinator will arrange for one)

2. Implement all applicable simple conservation measure

3. Implement 3 of the suggested or industry specific water conservation measures

Energy Conservation

1. Have your local energy utility or an energy service company conduct a commercial energy assessment (if your business has not already had an energy assessment, the Green Business Coordinator will arrange for one)

2. Perform regular maintenance on heating, ventilation and air conditioning (HVAC) system

3. Implement 2 alternative technologies and 5 behavioral changes

Solid Waste Reduction & Recycling

1. Conduct a waste reduction assessment of solid waste streams

2. Implement solid waste reduction and recycling measures:
- Reduce paper waste in 5 different ways
- Incorporate waste reduction methods in your business in 5 ways
- Segregate and recycle or reuse 5 types of materials from your solid waste streams
- Purchase 3 recycled or used materials/products for your business

Pollution Prevention

1. Conduct an assessment of your facility to identify pollution prevention opportunities

2. Implement pollution prevention measures:
- Implement 6 good housekeeping and operating practices
- Implement 3 material, product, technology or process changes
- Reuse or recycle hazardous materials/wastes in 3 ways
- Prevent contamination of storm water and runoff by implementing 4 measures
- Implementing at least 3 measures with the goal of reducing vehicle emissions

APPENDIX B-2

Charleston, South Carolina
Green Buildings Coordinator
Salary: $32,000-$70,000

The City of Charleston is seeking a Green Buildings Coordinator. This position promotes and facilitates the design and construction of resource efficient buildings in the municipal sectors of Charleston. Coordinator will design and implement programs in conjunction with other City agencies, raise funds, manage professional services contracts, and help create sustainable education opportunities for business and the public. This position serves as a senior staff level position in the City and County of Charleston.

Task include but not limited to:
-Works with other governmental agencies and private associations to promote Commercial Green Building projects.
-Develops and conducts Green Building Training Programs
-Tracks Green Building projects
-Participates and promotes local and regional Green Building Forums
-Provides assistance to architects, engineers, and consultants
-Plans and implements Green Building Program goals and objectives
-Develops and coordinates program budget
-Writes Grants supporting Green Building services
-Other duties as assigned

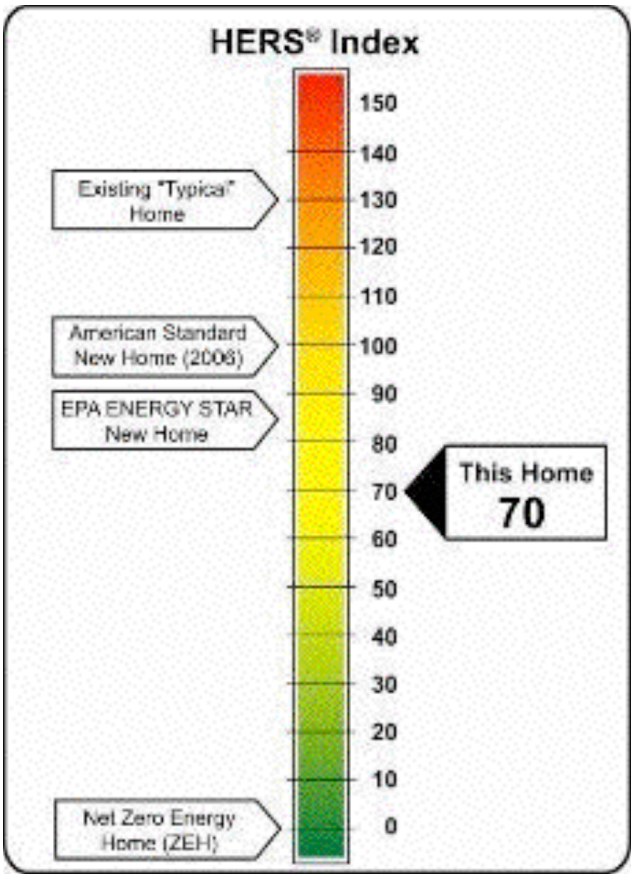
Qualifications:
Possession of Bachelor's Degree in Public or Business Administration, Environmental Sciences, or a closely related field. A Master's Degree in related field is desirable.

At least three years of professional experience implementing and managing environmental programs and/or implementing and managing green building related programs. Candidate must show knowledge of building design, sustainable building practices, construction process, state and local legislation, Energy Auditing experience preferred as well as an understanding of new buildings, existing buildings, deconstruction, and renovation. A demonstrated commitment to environmental sustainability and excellent personal relations skills are important.
It is recommended that the candidate is a LEED Accredited Professional and house the EarthCraft House certificate.

APPENDIX B-3

A home energy rating involves an analysis of a home's construction plans and onsite inspections. Based on the home's plans, the Home Energy Rater uses an energy efficiency software package to perform an energy analysis of the home's design. This analysis yields a projected, pre-construction HERS Index. Upon completion of the plan review, the rater will work with the builder to identify the energy efficiency improvements needed to ensure the house will meet ENERGY STAR performance guidelines. The rater then conducts onsite inspections, typically including a blower door test (to test the leakiness of the house) and a duct test (to test the leakiness of the ducts). Results of these tests, along with inputs derived from the plan review, are used to generate the HERS Index score for the home. (energystar.gov)

The HERS Index is a scoring system established by the Residential Energy Services Network (RESNET) in which a home built to the specifications of the HERS Reference Home (based on the 2006 International Energy Conservation Code) scores a HERS Index of 100, while a net zero energy home scores a HERS Index of 0. The lower a home's HERS Index, the more energy efficient it is in comparison to the HERS Reference Home.



APPENDIX E-3

EPA United States Environmental Protection Agency | Air and Radiation 6202J | April 2001

ENERGY STAR®

Buyer's Guide to Purchasing ENERGY STAR Labeled Office Equipment

Most of us don't think about saving money and improving the environment when we flip the switch on our computers or photocopy an important document. But with efficient ENERGY STAR® labeled office equipment, you can do just that!

Office equipment, led by computers, is the fastest growing electric load in the business world. In fact, office equipment accounts for about 11 percent of all commercial sector electricity usage. However, much of this energy is wasted. According to Lawrence Berkeley National Laboratory, most people leave their computers on throughout the business day although they only use their machines for four hours on average. What's more, approximately 57 percent of computers are left running at night and on weekends.

What is ENERGY STAR Labeled Office Equipment?

ENERGY STAR labeled office equipment helps reduce wasted energy. When an energy-efficient computer in not in use, it enters a low-power "sleep" mode. Sleep mode reduces the equipment's energy waste and saves money without sacrificing features, performance, or cost. An ENERGY STAR labeled computer in sleep mode consumes about 90 percent less electricity than it does in full-power mode.

Many of the manufacturers who produce the office equipment sold worldwide participate in ENERGY STAR. By looking for the ENERGY STAR label, you can easily identify products that save money and prevent air pollution.

ENERGY STAR vs. Conventional Equipment: What's the Difference?

When you see the ENERGY STAR label on a product, you can be sure that it meets the following efficiency guidelines:

- Computers: Power down to 15 watts or less in the low-power mode when using a 200-watt power supply.
- Monitors: Power down to 15 watts or less after 30 minutes of inactivity, and then down to 8 watts or less after a cumulative period of 60 minutes of inactivity.
- Printers and Fax Machines: Power down to 10-100 watts or less depending on the model's output speed and printer type after a predetermined period of inactivity set at the factory.
- Mailing Machines: Power down to 10-85 watts or less depending on the model's output speed after a predetermined period of inactivity set at the factory.
- Copiers: Depending on output speed and format type, power down to low-power mode after 15 minutes of inactivity and/or to 5-20 watts in off mode after 90 minutes or less of inactivity, ensuring that equipment is off during evening and weekend hours. Double-sided copying is recommended for medium- and high-speed models.
- Scanners: Power down to 12 watts or less in the low-power mode after 15 minutes of inactivity.
- Multifunction Devices: Power down to a low-power and/or sleep mode of no more than 25-106 watts after 15-120 minutes of inactivity, depending on output speed and format type.

- Upgradable Digital Copiers: Power down to a low-power and/or sleep mode of no more than 5-20 watts after 15-120 minutes of inactivity, depending on output speed and format type.

Conventional and ENERGY STAR labeled office equipment cost the same, but ENERGY STAR labeled equipment offers two important benefits: it saves money and helps the environment. Once ENERGY STAR labeled equipment is installed, savings can add up quickly. Multiply the per-unit savings by the number of products in your office to estimate how much you can save each year!

• Computer/Monitor	$45 per year
• Printer	$25 per year
• Medium-speed Copier	$25 per year
• Fax Machine	$9 per year
• Scanner	$7 per year

In a typical office of 100 people, annual savings could reach almost $5,000 per year:

• $45/year x 100 computers	$4,500
• $25/year x 10 printers	250
• $25/year x 4 copiers	100
• $9/year x 4 fax machines	36
• $7/year x 2 scanners	14
TOTAL ANNUAL SAVINGS:	$4,900

It takes ten times more energy to produce a piece of paper than to copy an image to it.

Lawrence Berkeley National Laboratory

Did You Know?

According to EPA estimates, if all purchasers in the United States bought ENERGY STAR labeled instead of conventional office equipment, the annual pollution prevented would be equivalent to removing the emissions from more than 14 million cars by 2010.

In addition to lowering operating costs, ENERGY STAR labeled copiers, multi-function devices (MFDs), and printers can also reduce paper use. Many provide duplexing (double-sided) capabilities, recommended as a default setting for medium- and high-speed models. By making double-sided copies, you can save $50-$150 per year on paper purchases for a medium-speed copier. Duplexing also adds to overall energy reduction.

Besides the cost savings, ENERGY STAR labeled equipment offers other important advantages:

- Added Comfort: ENERGY STAR labeled equipment produces less heat by powering down when not in use. This feature contributes to a cooler, more comfortable workspace and reduces air-conditioning costs.
- Improved Reliability: Heat can cause equipment failure. With the power-management feature, ENERGY STAR labeled equipment may last longer because it generates less heat.

Components that cycle, such as hard drives and microprocessors, are also more reliable when power management is enabled.

Is "Sleep" the Same as "Off?"

No! Equipment in sleep mode still uses some electricity, so always turn your equipment off if it will not be in use for long periods of time. Also, if you see a monitor with a screen saver, don't assume that it's saving energy. Screen savers are not an energy-efficiency feature. If you do use a screen saver, be sure your monitor is set to display images for a pre-determined period of time and then enter sleep mode.

What Else Should I Know About ENERGY STAR Labeled Office Equipment?

- Manufacturers are required to ship ENERGY STAR labeled equipment with the sleep feature enabled. It should arrive at your office that way.
- You may adjust the power management setting to conform to your work pattern using the Control Panel. Some computers require accessing the sleep feature through the BIOS or setup screen. If you have questions about activating or changing the sleep feature, refer to the owner's manual or call the manufacturer's help line.
- If your business operates on a Local Area Network (LAN), be sure to specify that the power-management feature on your computer is compatible with the existing network system. (As of this writing, the Windows NT operating system does not support power management.)

Did You Know?

The federal government is the single largest purchaser of information technology (IT) equipment in the world, accounting for approximately 5 percent of total IT sales. By purchasing energy-efficient IT products, the federal government is expected to save $1.1 billion between 1999 and 2010.

Lawrence Berkeley National Laboratory, 1999

- For additional savings, purchase printers and fax machines that print on both sides of a piece of paper. Buying a printer with a duplexing mode could save over $45 a month in paper costs, and purchasing a fax machine that scans double-sided pages saves copying and paper costs. Also consider buying a combination printer/fax unit, which will consume less energy since one unit can do the work of two.

How Can I Purchase ENERGY STAR Labeled Office Equipment for the Federal Government?

President Clinton's Executive Order 13123, issued on June 3, 1999, requires that federal agencies purchase ENERGY STAR and other energy-efficient office equipment. How can you buy ENERGY STAR labeled equipment? Just list ENERGY STAR as a requirement in your specification. The ENERGY STAR Web site, www.energystar.gov, includes information on specific procurement language to use.

How Should I Specify ENERGY STAR Labeled Office Equipment When Ordering from a Manufacturer?

When considering the purchase of ENERGY STAR labeled office equipment, it is important to use procurement language that includes ENERGY STAR specifications. Procurement language should indicate that the equipment "shall meet the ENERGY STAR specifications for energy efficiency." Language should also provide a detailed explanation of each ENERGY STAR specification. Complete procurement language is available at www.energystar.gov.

ENERGY STAR

ENERGY STAR is a trusted national brand symbolizing superior energy performance in over 30 categories of consumer electronics and appliances, as well as office buildings, schools, and homes. ENERGY STAR for Office Equipment is a voluntary partnership between the U.S. Environmental Protection Agency (EPA) and the office equipment industry that promotes energy-efficient products. Reducing the energy wasted in operating this equipment can help combat smog, acid rain, and climate change by decreasing emissions from energy generation.

For More Information

Visit www.energystar.gov. Choose "Find Products," then "Institutional Purchasing."

ENERGY STAR for Office Equipment
US Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Avenue, NW
MC 6202J
Washington, DC 20460
ENERGY STAR Hotline:
1-888-STAR-YES
(1-888-782-7937)

Energy Efficiency and Renewable
Energy Clearinghouse
US Department of Energy
PO Box 3048
Merrifield, VA 22116
1-800-DOE-EREC
(1-800-363-3732)

APPENDIX LU&P-1

The following table is from the 2005 Study Low Impact Development of Big Box retailers. These practices may be applied at any scale of development and should be included in the list of BMPs for City of Charleston's revised Stormwater Design Manual Draft Document (June 2008).

Table 1 - LID BMPS

1	Bioretention Basins (Peak and Volume)
2	Bioretention Cells (Water Quality Only)
3	Bioretention Slopes
4	Bioretention Swales
5	Water Quality Swales
6	Permeable/ Porous Pavements (Asphalt, Concrete, Blocks)
7	Tree Box Filters
8	Planter Boxes
9	Cisterns/ Rain Barrels
10	Green Roofs

APPENDIX LU&P-4

A complete street policy should include all of the following criteria:

1) Specifies that 'all users' includes pedestrians, bicyclists, transit vehicles and users, and motorists, of all ages and abilities.
2) Aims to create a comprehensive, integrated, connected network.
3) Recognizes the need for flexibility: that all streets are different and user needs will be balanced.
4) Is adoptable by all agencies to cover all roads.
5) Applies to both new and retrofit projects, including design, planning, maintenance, and operations, for the entire right of way.
6) Makes any exceptions specific and sets a clear procedure that requires high-level approval of exceptions.
7) Directs the use of the latest and best design standards.
8) Directs that complete streets solutions fit in with context of the community.
9) Establishes performance standards with measurable outcomes.

APPENDIX LU&P-5a

FROM THE UPSTATE CHAPTER OF THE SC NATIVE PLANT SOCIETY

NATIVE PLANT *alternatives*

www.scnps.org

These native plants are suggested as alternatives to invasive exotic species in Upstate South Carolina. All plants listed, both invasive exotics and natives, are available for sale in the market.

Non-native invasive	Native plant alternative
PRIVET, *Ligustrum spp.* (ev) –	Carolina cherry laurel, *Prunus caroliniana* (ev) Yaupon holly, *Ilex vomitoria* (ev) Inkberry holly, *Ilex glabra* (ev) Florida leucothoe, *Leucothoe populifolia* (ev) Wax myrtle, *Myrica cerifera* (ev)
AUTUMN OLIVE and RUSSIAN OLIVE, *Elaeagnus spp.* —	Native plums, *Prunus spp.* Possumhaw viburnum, *Viburnum nudum* Blackhaw viburnum, *Viburnum prunifolium* Winterberry, *Ilex verticillata* Possumhaw holly, *Ilex decidua* Native blueberries, *Vaccinium spp.*
JAPANESE HONEYSUCKLE, *Lonicera japonica* (ev) —	Carolina jessamine, *Gelsemium sempervirens* (ev) Coral honeysuckle, *Lonicera sempervirens* (ev) Cross vine, *Bignonia capreolata* (ev)
BRADFORD PEAR, *Pyrus calleryana* —	Various hawthorns, *Crataegus spp.* Serviceberry, *Amelanchier spp.* Redbud, *Cercis canadensis* Fringe tree, *Chionanthus virginicus* Red maple, *Acer rubrum* Southern sugar maple, *Acer barbatum*
MIMOSA, *Albizia julibrissin* —	Redbud, *Cercis canadensis* Honey locust, *Gleditsia triacanthos* Serviceberry, *Amelanchier spp.* Dogwood, *Cornus florida* Fringe tree, *Chionanthus virginicus*
ENGLISH IVY, *Hedera helix* (ev) —	Trumpet creeper, *Campsis radicans* Virginia creeper, *Parthenocissus quinquefolia* Carolina jessamine, *Gelsemium sempervirens* (ev) Wild ginger, *Asarum canadense, Hexastylis spp.* (ev) Galax, *Galax aphylla* (ev) Allegheny spurge, *Pachysandra procumbens* (ev) Cross vine, *Bignonia capreolata* (ev) Green and gold, *Chrysogonum virginianum* Wild phlox, *Phlox spp.*

APPENDIX LU&P-5b

Native Plant Sources in the Lowcountry

Blackwater Nurseries, LLC Greenpond, SC Phone 843-871-4386 Fax 843-871-4386 Specializes in grasses and wetland plants	**Charleston Aquatic Nurseries** 3095 Canal Bridge Rd. Johns Island, SC 29455 Brian@charlestonaquatics.com Phone: 843-559-3151 Toll Free: 800-566-3264 Fax: 843-746-4588 Grower, Retail, Landscaper, Aquatic Plants
Legare Farms, Inc. Helen Legare-Floyd 2620 Hanscombe Point Rd. Johns Island, SC 29455 Phone: 843-559-0788 Mobile: 843-514-1218 Fax: 843-559-3524 LegareNS@bellsouth.net Trees, Shrubs Grower, Grower, Retail, Wholesale Grower, Sod-Grower	**Pon Pon Nursery, LLC** 8654 Savannah Highway Adams Run, SC 29426 phone 843.556.4399 fax 843.556.6156 ponponnursery@gmail.com Open by appointment only. Specializes in trees and woody ornamentals, wildflower and grass seed applications and offers consulting services.
Church Creek Nursery Inc. 5756 Grimshaw Rd John's Island, SC 29455 Phone: 843-559-2323 churchcree@aol.com Grower, Retail	**Mepkin Abbey** 1098 Mepkin Abbey Road Moncks Corner, SC 29461 843-761-8509 Native herbaceous plants and grasses.

Native Plant Sources in the Lowcountry

Blackwater Nurseries, LLC Greenpond, SC Phone 843-871-4386 Fax 843-871-4386 Specializes in grasses and wetland plants	**Charleston Aquatic Nurseries** 3095 Canal Bridge Rd. Johns Island, SC 29455 Brian@charlestonaquatics.com Phone: 843-559-3151 Toll Free: 800-566-3264 Fax: 843-746-4588 Grower, Retail, Landscaper, Aquatic Plants
Legare Farms, Inc. Helen Legare-Floyd 2620 Hanscombe Point Rd. Johns Island, SC 29455 Phone: 843-559-0788 Mobile: 843-514-1218 Fax: 843-559-3524 LegareNS@bellsouth.net Trees, Shrubs Grower, Grower, Retail, Wholesale Grower, Sod-Grower	**Pon Pon Nursery, LLC** 8654 Savannah Highway Adams Run, SC 29426 phone 843.556.4399 fax 843.556.6156 ponponnursery@gmail.com Open by appointment only. Specializes in trees and woody ornamentals, wildflower and grass seed applications and offers consulting services.
Church Creek Nursery Inc. 5756 Grimshaw Rd John's Island, SC 29455 Phone: 843-559-2323 churchcree@aol.com Grower, Retail	**Mepkin Abbey** 1098 Mepkin Abbey Road Moncks Corner, SC 29461 843-761-8509 Native herbaceous plants and grasses.

APPENDIX LU&P-5c

Scientific name	Common name	Size	Number	Price
Grass/ sedge				
Andropogon gerardii	Big Bluestem	1g	30	6.00
Andropogon glomeratus	Bushy Bluestem	1g	30	4.00
Chasmanthium latifolium	Slender woodoats	1g	20	4.00
Eragostis trichodes	Sand lovegrass	1g	30	6.00
Muhlenbergia filipes	Sweetgrass	1g	100	5.00
Saccharum (Erianthus) giganteus	Sugarcane Plumegrass	1g	20	4.00
Schizachyrium scoparium	Little Bluestem	4"	40	3.00
Herbaceous Flowers				
Babtisia australis	Blue false indigo	4"	18	3.00
Canna flacida	Golden Canna	3g	10	10.00
Coreopsis lanceolata	lanceleaf coreopsis	1g	40	5.00
Erythrina herbacea	Coral bean	1g	10	8.00
Eupatorium coelestinum	Mistflower	1g	5	6.00
Eupatorium perfoliatum	Boneset	1g	5	6.00
Gallardia grandiflora	Blanket flower	4"	36	3.00
Gallardia pulchella	Gallardia	4"	36	3.00
Helianthus angustifolius	Narrowleaved sunflower	1g	40	5.00
Helianthus strumosus	Roughleaved sunflower	1g	9	6.00
Hibiscus coccineus	Scarlet Rose Mallow	1g	40	5.00
Hibiscus moscheutos	Crimson-eyed Rose mallow	1g	20	6.00
Hyptis alata	Bushmint	1g	50	6.00
Iris virginica	Blue flag iris	4"	30	5.00
Liatris spicata	blazing star	1g	45	5.00
Lobelia cardinalis	Cardinal flower	4"	30	5.00
Melanthera hastata	Melanthera	1g	5	6.00
Oenothera biennis	Common evening primrose	4"	36	3.00
Oenothera tetragona	Northern Sundrops	1g	10	6.00
Phlox paniculata		1g	25	4.00
Pityopsis graminifolia	grass-leaved goldenaster	1g	25	4.00
Rudbeckia fulgida	Black-eyed susan	1g	40	5.00
Rudbeckia hirta	Black-eyed susan	4"	18	3.00
Rudbeckia hirta	Black-eyed susan	1g	10	6.00
Ruella humilis	Wild petunia	1g	15	6.00
Salvia lyrata	Lyre-leaved Sage	1g	10	6.00
Sisyrinchium angustifolia	Blue-eyed grass	1g	80	5.00
Solidago rugosa	Goldenrod	1g	5	6.00
Solidago sempervirens	Seaside goldenrod	1g	40	4.00
Solidago speciosa	Showy goldenrod	1g	5	6.00

APPENDIX T-1

What Are the Upfront Costs of Networking (VPN Tools 2008)?

Component	Cost Range
Hub	$30-$300
Router	$75-$300
In-Wall Cabling	$750-$150/per
Switch	$200-$1000
Server	$1,500-$20,000
Network Operating System	$799-$2500
Network Interface Card	$15-$150
Spare Cables	$5-$25

VPN Products

VPN Firewalls

-3Com; PathBuilder S500 Tunnel Switch Family (Switch with routing, VPN, firewall for User-to-site) $30,295
-Axent Technologies; Raptor Firewall/VPN Server (VPN with firewall for User-to-site) $5,000 for software
-Check Point Software; VPN-1 Gateway Solution with VPN-1 Accelerator Card (Firewall with VPN for User-to-site) $14,980 (with VPN-1 Accelerator cards) $6,990 (without VPN-1 Accelerator cards)
-Check Point VPN-1 Edge XU Firewall $1,356 - $1,999
-Cisco vpn client softare : $39.92
-Trend Micro client/server suite : $22.36
-Data Fellows; F-Secure VPN+ 4.0 (Software-based VPN, firewall, router for User-to-site) $4,990
-Internet Dynamics ; Conclave 1.52 (Integrated firewall with VPN, remote access, virus scanning for User-to-site) $4,480 for software
-Multitech sytems; Internet security appliance RF660vpn. $1,277.49
-Lucent; VPN Gateway 2.0 with Encryption Accelerator Card (VPN gateway with firewall for User-to-site) $25,980
-Microsoft ; Windows NT Server 4.0 SP4 Routing and Remote Access Service (Router with VPN on the operating systemfor User-to-site) $1,618 for software
-Multi-Tech Route Finder VPN Internet Security Appliance (RF600VPN) Firewall $641 - $738
-Symantec; Norton personal firewall for macintosh $62.81
-Novell; BorderManager Firewall Services 3 (Directory-based software VPN for User-to-site) $1,990 for software
-SonicWALL SSL-VPN 2000 Firewall by sonic WALL for $1,585 - $1,995
-Symantec Enterprise Firewall+VPN High Availability+ $1,254.99+$18.13
-Wathguard UPG watchguard firebox soho license to 25users : $163.64
-watchguard firebox soho branch office vpn - $280.27
-watchguard mobile user vpn -: $808.33

VPN Routers

-Belkin Wireless Pre-N Router $90 - $160
-Compatible Systems; IntraPort 2+ (Dedicated VPN hardware for User-to-site) $13,990 (includes 1 IntraPort 2+ and 1 IntraPort 2)
-D-Link DI-824VUP Wireless Router $115 - $170
-Intel; LanRover VPN Gateway 6.6 (VPN hardware with firewall, routing for User-to-site) $18,500
Linksys Wireless-G WRT54GS Router $49 - $80
-Nortel Networks ; Contivity Extranet Switch 1500, 2.0 (Encrypting router with firewall for User-to-site) $14,000
-RedCreek Communications ; Ravlin 10/5100 3.0.2 (Dedicated VPN hardware for User-to-site) $8,300
-TimeStep; TimeStep Permit Gateway 4520 (Dedicated VPN hardware for User-to-site) $16,985
-VPNet Technologies ; VPNware VSU-1100, 2.51 (Dedicated VPN hardware for User-to-site) $37,985

Remote Access Servers

-Symantec VPN Gateway 4420 Appliance, Remote Access Server $2,220 - $3,022
-Cisco VPN3030, Remote Access Server $16,461
-Nortel Alteon SSL VPN, Remote Access Server $9,620
-Symantec Platinum Support Gateway Security C2G VPN $65.99+ $13.73

VPN concentrator for enterprises

-Cisco VPN 3000 Concentrator Series £ 1596.57
-Altiga C10 VPN Concentrator: $10,000

UTM-Unified Threat Management

-Edge Force, These devices are for small business interconnection and VPN and depends upon size of company $ 1000 to $14000.

Many factors need to be considered before settling on a VPN strategy. Compatibility with existing equipment, management workloads and extra features decide the price of VPN equipment. Take time to test prospective products before you buy.

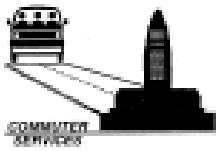
Student case study: Cost-Savings of Telecommuting

Student participated in class by means of telecommuting. To do this, webcams were coordinated between the student and a member of the class through an online telecommuting program. Class was held at College of Charleston two days per week. The following is a chart comparing the cost and savings of using telecommuting as a method of class attendance:

Cost		**Savings**	
Description of activity	*Monetary amount (per six weeks)*	*Description of activity*	*Monetary amount (per six weeks)*
Webcam with microphone	$22.78	Gas (240 miles roundtrip at $.042 per mile)	$1209.60
Online Telecommuting download	Free	Daycare (at $132 per week)	$316.80
		Parking ($2.50 per day)	$30.00
Total Cost	**$22.78**	Total Savings	**$1556.40**

*$0.42 was used per mile based on the state average

Additional Benefits
Saves 48 hours per six weeks in driving time



CITY OF LOS ANGELES
TELECOMMUTING APPLICATION

When completed by employee AND his/her supervisor, a copy of this form should be sent to:
Commute Options and Parking Section, City Hall, Room 867, 200 N. Spring Street, Mail Stop 621

SECTION I. EMPLOYEE

In order to determine eligibility for the City of Los Angeles Telecommuting Program, please complete the information below. This form is designed to be a discussion tool for you and your supervisor to examine the feasibility of telecommuting. Please type or print legibly.

1. Name: _____ 2. Job Class: _____
3. Department/Bureau: _____
4. Work Address: _____ 5. Mail Stop: _____
6. Work Phone: _____ 7. Dept. #: _____ 8. Div. #: _____
9. Supervisor's Name: _____ 10. Supervisor's Phone: _____
11. Home Address: _____ 12. Home Zip: _____
13. Commute distance from home to regular work location (in one-way miles): _____
14. Considering the nature of your job, how often do you propose to telecommute?

___ Less then one day a month	___About once a week	___Four days a week
___One day a month	___Two days a week	___All the time, with weekly office visits
___Once every two weeks	___Three days a week	___Occasionally, for special projects

15. When you telecommute, what hours do you propose to work? _____
16. Why have you proposed these days and hours? _____
_____
17. Briefly discuss your typical job duties or assignments. _____
_____
18. How will these tasks be accomplished while telecommuting? _____
_____
19. Special Considerations: _____
_____
20. If telecommuting from home, do you have a separate space available to work? (Please Attach a photo, if you have one, of your proposed workspace). ___Yes ___No

21. Are there distractions/obligations that will make working at home difficult or impossible?

___Yes ___No If "yes," please describe._____

_____

22. **Work Characteristics**. Please rate the following according to your job requirements and characteristics.

	High	Med.	Low
Amount of face-to-face contact required.	____	____	____
Ability to organize/schedule meetings for pre-determined time periods.	____	____	____
Degree of telephone communication required.	____	____	____
Doing work independently.	____	____	____
Ability to control and schedule work flow.	____	____	____
Amount of in-office reference materials required.	____	____	____
Dependence upon support staff.	____	____	____

23. **Employee Characteristics**. Rate the following according to your own characteristics as an employee and telecommuter

	High	Med.	Low
Need for supervision, frequent feedback.	____	____	____
Meeting deadlines.	____	____	____
Quality of organizational and planning skills.	____	____	____
Discipline regarding work.	____	____	____
Reliability concerning work hours.	____	____	____
Computer literacy level.	____	____	____
Desire/need to be around people.	____	____	____
Desire for scheduling flexibility for any reason.	____	____	____
Potential interruptions at home if telecommuting (e.g., child care, elder care)	____	____	____
Level of job knowledge.	____	____	____
Productivity.	____	____	____
Quality of work.	____	____	____

24. Do you need physical security of the information, data and materials you work with? (Check One.)

___ Yes (Answer Question 25). ___ No (Go to Question 26). ___ Not Applicable (Go to Question 26).

25. As a telecommuter, what information security issues can you anticipate? (Please be specific.)

_____

_____

_____

26. What kinds of work would you expect to do while telecommuting? (Mark as many as apply.)

___Writing/Typing	___Talking on the telephone	___Field visits
___Work Processing	___Sending/receiving electronic mail	___Reading
___Administrative	___Thinking/planning	___Research
___Accounting	___Date Management	___Computer programming

___Other (please specify) _____

27. Given the amount of telecommuting appropriate for you, and the kinds of work you would do while telecommuting, what equipment/services do you think you need, and which of those do you currently have?

	Need	**Currently Have**
Personal computer/laptop	____	____
Monitor	____	____
Printer	____	____
Modem/communications software	____	____
Other software (e.g., Word, Excel, Access, etc.)	____	____
Additional phone lines	____	____
Fax machine	____	____
Voice Mail	____	____
Other (Please specify)		

After completing Questions #1 through #27, give this to your supervisor. Please arrange to discuss your request for telecommuting with your supervisor after he/she completes Section II, Questions #28 through #32, below.

SECTION II. SUPERVISOR

Telecommuting is a management option, not an employee entitlement. However, in an effort to improve efficiency and meet clean air/trip reduction goals, it is the City's position to encourage telecommuting wherever and whenever possible.

In answering the questions that follow, please respond objectively, giving a reasonable benefit of doubt. Remember, if an employee is given a telecommuting assignment and fails to perform (or discovers that the arrangements are not "right"), participation may be discontinued upon adequate prior notice.

28. Given your work experience with this employee, do you agree with the answers your employee gave in Question #22 regarding his/her WORK characteristics? ___ Yes ___ No

If you feel that any of these characteristics (as they apply to this employee) are likely to make telecommuting unsuccessful, please indicate your reasons: _____

_____

_____

29. Given your work experience with this employee, do you agree with the answers your employee gave in Question #23 regarding the EMPLOYEE'S characteristics? ___ Yes ___ No

    If you feel that any of these characteristics (as they apply to this employee) are likely to make telecommuting unsuccessful, please indicate your reasons: _____

    _____

    _____

30. Did YOU (as a supervisor or telecommuter) participate in the City of Los Angeles Telecommuting Pilot Project (between 1990-1993)? ___ Yes ___ No

31. Have you ever received Telecommuting Orientation/Training (Optional)? ___Yes ___ No

    If "yes," please describe._____

    _____

32. Please rate this employee in terms of your willingness to allow telecommuting:

    ___ Not willing at all. ___ Have reservations, but willing on a trial basis. ___ Completely willing.

The above information has been reviewed and discussed by the prospective telecommuter and telemanager.

Telecommuter's Signature: _____ *Date:*_____

Telemanager's Signature: _____ *Date:*_____

Department's/Bureau's ___ *Approval* ___ *Disapproval.*

*Signature:*_____ *Date:*_____

(Note: If approved, actual telecommuting is subject to Dept/Bureau approval and completing the "Telecommuting Win-Win Agreement.")

FOR COMMUTER SERVICES OFFICE USE ONLY:

CSO receipt of application: Staff: _____ *Date:*_____

Notes:

APPENDIX W/R-2

From Christine Cooley at MUSC concerning their recycling:

The city does not recycle other plastic because the county does not accept it. The markets for plastic are not as good as the markets for paper. Plastic recycling is complicated because of all the various types of plastic resin. You cannot mix these resins for actual recycling. The collection process that is most efficient is to collect all the various resin types together but then you have to separate them before you actually recycle them in most cases. It takes a lot of labor or sophisticated high dollar machinery to separate all these resin types.

I am trying to set up recycling for other plastic from MUSC and the market that I am working with is being very fickle. They say they want it but they are not giving me prices and they are dragging their feet. I have been trying to set this up for months now. So that makes us somewhat wary of them as a long term market. My volume is small so I can stop or start without too much hassle. But I don't like doing that. Once I start a program, I want to be sure it can go on for as long as needed. Educating people takes too much time and money to stop and start all the time.

If I was a county or city with county or city volume I would want to be extra careful before instituting a new program because these markets are tricky. You don't want to say you can collect something before you are sure the market is rock solid. Again, education is the problem here. You don't tell 100,000 people they can recycle #5 plastic today and then tell them next week they can't. This is a dive in the deep end sort of thing. Once you jump you jump and there is no turning back.

If the price of fuel goes back up and stays up then plastic recycling will be more stable. As long as fuel prices are so volatile, plastic recycling will be too.

Curbside collection is a long way off. They would have to build a whole new MRF. Charleston County may actually do that and they have plans to but their plans did not include other plastics. We are working very hard through the City Green Committee and the County Green Ribbon Committee to change their minds. It would be great if there were a campaign from citizens all asking for more recycling of plastic.

In the end economics will rule the day no matter what we want. If the markets aren't there they aren't there. What we need is to make sure that the County or a private company at least has it in their ability to ramp up to recycle other plastic when the time comes.

One thing to be careful of is to always question things. In communities that are "collecting" all plastics curbside that does not me those plastics are being recycled. They take all the plastic to a MRF and sort it out and if they have a market the material goes to market if not it may end up in a landfill or maybe it is burnt in an incinerator for energy. Items get shipped overseas and unless it is certified recycled it may end up in an overseas

landfill. I have heard horror stories. I always want to be sure before I collect items and send them to a processor that that processor is reputable and that they have a market that will actually recycle the product.

Recently because of the downturn in the economy, worldwide markets for all recyclables have been hit hard. Prices paid for material have fallen back to early 90's prices. Some processors are stockpiling material and waiting for the market pricing to go back up. So you may be sending your material for recycling but it is actually being sent to a warehouse for storage. I feel confident that all that material will eventually actually be recycled but it will take months or even a year or more for all this to be worked out.

Watch China. If they stabilize their markets then recycling will be better off. If they don't then we'll just have to see what happens.